Xserve

Apple Xserve Diagnostics User Guide

For Version 3X104

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Overview and Requirements

1

Apple Xserve Diagnostics tests your Intel-based Xserve computer for hardware issues.

Apple Xserve Diagnostics (AXD) runs a customizable set of tests to help you diagnose issues with the following Xserve components:

- Boot ROM
- Ethernet controller
- Fan
- Hard drive
- Memory
- Power supply
- Processor
- Sensor
- USB ports
- Video controller

You can run AXD in Extensible Firmware Interface (EFI), which is referred to as *AXD EFI tools,* or in Mac OS X or Mac OS X Server, which is referred to as *AXD Mac OS X tools*.

By running AXD EFI tools, you can diagnose hardware issues that prevent Mac OS X Server from successfully starting up. You can also run tests without interference from Mac OS X Server and test more than 2.5 gigabytes (GB) of memory. However, AXD Mac OS X tools provides an enhanced interface and has more extensive sensor, hard drive, and video controller tests. For a detailed comparison and description of all available tests, see "AXD Tools Test Reference" on page 35.

You can test the Xserve by running AXD tools directly on the Xserve. You can also run AXD tools on a computer that has a network connection to the Xserve and test the Xserve remotely.

Note: This guide describes how to use AXD version 3X104, which is included on the *Admin Tools* disc (version 10.5 or later). If you're using a different version of AXD tools, the instructions in this guide might not work. You can find out which version of AXD tools you're using by opening AXD Mac OS X tools and choosing AXD > About Apple Xserve Diagnostics.

Overview of AXD Configurations

You can install and run AXD tools in a variety of ways, so choose the method that best suits your needs. There are several options, each with advantages and disadvantages:

Option	Considerations
Host a NetBoot server	Advantages: • You can use AXD EFI tools • You don't need to install AXD tools on an internal volume on the Xserve or on a portable storage device • You can use a single AXD install image to test multiple Xserve computers • You can start up AXD tools without an input device connected to the Xserve (if you have access to the Xserve front panel) Disadvantages: • You need physical access to the Xserve • You need a server to host NetBoot service and the AXD install image • The Xserve must be on the same subnet as the NetBoot server
Install AXD EFI tools on an internal volume	Advantages: • You can use AXD EFI tools • You don't need a portable storage device Disadvantages: • You need physical access to the Xserve • You need a volume on the Xserve that has 30 megabytes (MB) free and doesn't have Mac OS X or Mac OS X Server installed
Install AXD EFI tools on a portable storage device	Advantages: • You can use AXD EFI tools • You can use the same portable storage device to test multiple Xserve computers Disadvantages: • You need physical access to the Xserve • You need a volume on the portable storage device that has 30 MB free and that doesn't have Mac OS X or Mac OS X Server installed • The portable storage device must be physically connected to the Xserve

Option	Considerations
Start up the AXD EFI tools located on the *Admin Tools* disc	Advantages: • You can use AXD EFI tools • You can use the same disc to test multiple Xserve computers Disadvantages: • You need physical access to the Xserve • You must insert the disc in the Xserve • You can't save logs or take screen shots
Install AXD Mac OS X tools on an internal volume	Advantages: • You can use AXD Mac OS X tools • You don't need physical access to Xserve to run AXD Mac OS X tools remotely (if you have Apple Remote Desktop) Disadvantages: • You need an empty volume on the Xserve with 7 GB free • You must install Mac OS X Server on the empty volume
Install AXD Mac OS X tools on a portable storage device	Advantages: • You can use AXD Mac OS X tools • You can use a single portable storage device to test multiple Xserve computers Disadvantages: • You need an empty volume on the portable storage device with 7 GB free • You must install Mac OS X Server on the empty volume • The portable storage device must be physically connected to the Xserve

Requirements

Before you can run AXD tools, you must meet general, storage device, and local and remote requirements.

General Requirements

To run AXD tools, you must have the following:

- An Intel-based Xserve with Mac OS X Server version 10.5 or later installed
- The *Mac OS X Server Install DVD* and *Admin Tools* disc included with the Xserve (both should be version 10.5 or later)

Storage Device Requirements

Depending on whether you want to run AXD EFI tools, AXD Mac OS X tools, or both, you need empty volumes on the Xserve or on a portable storage device.

If you want to run AXD Mac OS X tools, the storage device must use the GUID Partition Table partition scheme. If you're running only AXD EFI tools on the storage device, you don't need to use the GUID Partition Table partition scheme.

You can run both AXD tools by having two empty volumes on the same Xserve or portable storage device. You need at least one of the following:

Goal	Requirement
Run AXD EFI tools	A volume on the Xserve that has at least 30 MB free, but doesn't have Mac OS X or Mac OS X Server installed
Run AXD Mac OS X tools	An empty volume on the Xserve with at least 7 GB free
Test multiple Xserve computers and run AXD EFI tools	A USB 2.0 flash drive, or USB 2.0 or FireWire hard drive with a volume that has at least 30 MB free but doesn't have Mac OS X or Mac OS X Server installed
Test multiple Xserve computers and run AXD Mac OS X tools	A USB 2.0 or FireWire hard drive that has an empty volume with at least 7 GB free

Local and Remote Requirements

To run AXD tools on your local Xserve, you need to attach a keyboard, mouse, and display.

To run AXD tools remotely, you must have the following:

- A Macintosh computer with Mac OS X version 10.5.4 or later installed. This computer is referred to as the *host computer*.
- A network connection with DHCP active or a direct Ethernet connection from the host computer to the Xserve. The Xserve is referred to as the *client Xserve*.
- If the client Xserve is going to run AXD EFI tools and use a network connection, the network connection must use a built-in Ethernet port, and not an Ethernet adapter card.
- The Xserve must have AXD tools installed either on an internal volume or on a connected portable storage device; or it must be able to run AXD tools from a NetBoot server.
- The host computer must run AXD Mac OS X tools. The client Xserve can run AXD EFI tools or AXD Mac OS X tools.

- If the client Xserve is running AXD Mac OS X tools, you must be able to log in as the *root* account. The root account gives a system administrator complete access to the Xserve.

If you want to run AXD tools entirely remotely (for situations where the Xserve is physically inaccessible or if you want to save AXD EFI tools test results), in addition to meeting the network requirements, the Xserve must be able to start up Mac OS X Server.

NetBoot Server Requirements

To host AXD EFI tools on a NetBoot server, your NetBoot server also must:

- Have Mac OS X Server version 10.5.4 or later installed.
- Be on the same subnet as the Xserve being tested.
- Have 30 MB of hard drive space available for an AXD NetBoot image.

Setup and Installation

2

Before you can run AXD tools, you must set up your testing environment and install AXD.

Make sure you meet AXD requirements before attempting setup and installation. For more information, see "Requirements" on page 7.

Setting Up a NetBoot Server

Before you set up a NetBoot server, make sure you have an available server that meets the requirements described in "NetBoot Server Requirements" on page 9.

After you set up a NetBoot server, you install the AXD NetBoot image. Because the AXD NetBoot image is a special image, you can't use System Image Utility to delete the image.

For information about deleting the AXD NetBoot image, see the next section, "Deleting the AXD NetBoot Image."

To set up a NetBoot server:

1. Open Server Admin (located in /Applications/Server/).
2. If the server that will host NetBoot isn't listed, click the Add (+) button and choose Add Server. Enter the IP address of the server in the Address field, enter the user name and password of the server administrator in the User Name and Password fields, and then click Connect.
3. Click the disclosure triangle for the server that will host NetBoot.
4. If NetBoot isn't listed, select the server and click Settings. In the Services pane, select NetBoot and then click Save.
5. Select NetBoot, click Settings, and then click General.
6. In the "Enable NetBoot on at least one port" list, select the Enable checkboxes for the interfaces that you want to serve the AXD NetBoot images over.

If multiple network interfaces are listed, it's likely that only one of the interfaces is on the same subnet as your Xserve. If you're not sure which interface is on the same subnet, open Network Utility (located in /Applications/Utilities/) on your NetBoot server and your Xserve. In the Info pane, choose different network interfaces on the NetBoot server and your Xserve and compare the IP Address fields. Usually, computers are on the same subnet if their IP addresses start with same numbers (for example, they both start with 192.168.2).

7. In the volume list, select the Images checkbox and Client Data checkbox for the volume that will store the AXD NetBoot image.

   The volume must have at least 30 MB free.

8. Click Save.
9. In the Finder, navigate to the AppleXserveDiagnostics folder on the *Admin Tools* disc, and then open AppleXserveDiagnosticsNetBoot.pkg.
10. Follow the onscreen instructions to install the AXD NetBoot package.
11. In Server Admin, select NetBoot, and then click Images.
12. If the AXD NetBoot image has the same index (listed in the Index column) as another image, deselect the Enable checkbox for the conflicting image.

    Don't change any of the default AXD NetBoot image settings.
13. Click Start NetBoot.

Deleting the AXD NetBoot Image

You can't use System Image Utility to delete the AXD NetBoot image. Instead, you must delete the AXD NetBoot image in the NetBoot image folder, which is located at:

/Volumes/*volumename*/Library/NetBoot/NetBootSP#

Replace *volumename* with the name of the volume that you're installing the AXD NetBoot image onto. The number (#) varies depending on whether you're using several NetBoot volumes. If you're using only one NetBoot volume, the AXD NetBoot image is located in NetBootSP0. If you're using several NetBoot volumes, the AXD NetBoot image may be located in another folder (for example, NetBootSP1, NetBootSP4, or NetBootSP11).

To delete the AXD NetBoot image:

- Open the Finder and delete AXD.nbi from the NetBoot image folder.

Setting Up a Storage Device for AXD Tools Installation

To set up an internal volume or portable storage device for AXD tools installation, you must have at least 30 MB of available space for AXD EFI tools or at least 7 GB of available space for AXD Mac OS X tools, which requires installing Mac OS X Server. These requirements are described in detail in "Storage Device Requirements" on page 8.

If you're installing AXD Mac OS X tools on one of the volumes, the storage device should use the GUID Partition Table partition map scheme. To view the storage device's partition map scheme, open Disk Utility and select the storage device. Make sure you select the storage device and not a volume within the storage device. At the bottom of the Disk Utility window, Partition Map Scheme should be GUID Partition Table.

If you want to repartition an in-use storage device, run Disk Utility from the *Mac OS X Server Install DVD* or run Disk Utility while your Xserve is connected to another computer and is in target disk mode. Both of these methods erase the contents of your Xserve computer's hard drive and require you to reinstall and reconfigure Mac OS X Server.

> ***WARNING:*** The following instructions could erase all data on your storage device. Back up critical data before performing the following instructions.

To create empty storage device volumes and correctly format them:

1. Insert the *Mac OS X Server Install DVD*.
2. Open the Install Mac OS X Server application, click Restart, and authenticate if requested.

   The computer restarts and opens the Mac OS X Server Installer.
3. Select a language and click Next (right-arrow).
4. Choose Utilities > Disk Utility.
5. Select the storage device that you want to set up.

   Make sure you select a storage device, and not volumes within the storage device. Volumes within a storage device are indented one level.
6. Click the Partition tab.
7. If the partition map scheme of the storage device is not GUID Partition Table and you're going to install AXD Mac OS X tools, choose something besides "Current" in the Volume Scheme pop-up menu, then click Options, select GUID Partition Table, and click OK.

   Changing the volume scheme erases all data on the storage device.
8. Review the partition sizes and adjust them to meet AXD tools storage requirements.

To do this	Do this
Display a partition's size	Click the partition and review the Size field.
Set the size of the partition	Edit the Size field.
Create more partitions	Select a partition and click the Add (+) button.
Delete partitions	Select it and click the Delete (–) button.
Name a partition	Select it and enter a name in the Name field. If you're installing AXD EFI tools, name the volume AXDEFI3X104. Because this name is used when selecting which volume to start up Mac OS X from, choose a name that identifies the volume as being used for AXD tools. You can't rename a partition.

9 If you're installing AXD EFI tools in a volume, select the volume and choose MS-DOS (FAT) from the Format pop-up menu.

If you're installing AXD Mac OS X tools in a volume, select the volume and choose Mac OS Extended (Journaled).

10 Click Partition.

11 Choose Disk Utility > Quit Disk Utility, and then choose Mac OS X Installer > Quit Mac OS X Installer.

After you finish setting up volumes, you can install AXD EFI tools or AXD Mac OS X tools. For more information, see the following topics:

- "Installing AXD EFI Tools" on page 13
- "Installing AXD Mac OS X Tools" on page 14

Installing AXD EFI Tools

Before you install AXD EFI tools, make sure that your storage device has a volume that has at least 30 MB available, is formatted as MS-DOS (FAT), and is named AXDEFI3X104. Because the volume will be erased, make sure all important data on the volume is backed up. For more information, see "Setting Up a Storage Device for AXD Tools Installation" on page 12.

To perform these instructions, you'll need the *Admin Tools* disc (version 10.5 or later) included with the Xserve.

If you're performing this task to install AXD EFI tools on an internal volume on the Xserve, you'll need administrator access to the Xserve. If you're performing this task to install AXD EFI tools on a portable storage device, you can use any computer that you have administrator access to.

If you want to connect a host computer directly to the Xserve, and the host computer doesn't provide DHCP service on the port used to directly connect to the Xserve, you'll need to create a file on the Xserve that assigns an IP address to the Xserve. However, if the host computer provides DHCP service, don't create this file. For information about how to find out if a computer is providing DHCP service, see *Network Services Administration* at:

www.apple.com/server/macosx/resources

To install AXD EFI tools:

1. Insert the *Admin Tools* disc.
2. Open AppleXserveDiagnosticsEFI.pkg (located on the disc in /AppleXserveDiagnostics/).
3. Follow the onscreen instructions, and at the Select Destination step, choose a volume that has at least 30 MB of space available.
4. If you're prompted to authenticate, authenticate as a user with administrator privileges.
5. If you want to connect a host computer directly to the Xserve and the host computer doesn't provide DHCP service on the port used to directly connect to the Xserve, do the following:
   a. Open TextEdit (located in /Applications/).
   b. In the body of a new file, enter an IP address that's not in use by the host computer. For example, enter:

      123.123.123.123

      If TextEdit doesn't open with a new blank file, choose File > New.
   c. Choose Format > Make Plain Text.
   d. Choose File > Save As.
   e. Name the file axd_set_ip_address, and then change the location of the file to the volume with AXD EFI tools installed.
   f. Select "If no extension is provided, use '.txt'," and then click Save.

Installing AXD Mac OS X Tools

Before you install AXD Mac OS X tools, make sure that your storage device uses the GUID Partition Table partition scheme and that it has an empty volume with 7 GB of available space. For more information, see "Setting Up a Storage Device for AXD Tools Installation" on page 12.

If you're performing this task to install AXD Mac OS X tools on an internal volume on the Xserve, you'll need administrator access to the Xserve. If you're performing this task to install AXD Mac OS X tools on a portable storage device, you can use any computer that you have administrator access to.

Installing AXD Mac OS X tools involves three steps:

- Install Mac OS X Server with minimal options selected
- Copy AXD Mac OS X tools from the *Admin Tools* disc to /Applications/
- Configure Mac OS X Server

By dedicating a minimal installation of Mac OS X Server for use with AXD Mac OS X tools, you reduce the risk of server processes interrupting AXD testing.

To install AXD Mac OS X tools:

1. Insert the *Mac OS X Server Install DVD*.
2. Open the Install Mac OS X Server application, click Restart, and authenticate if requested.

   The computer restarts and opens the Mac OS X Server Installer.
3. Continue through the Installer until you reach the Select Destination step.
4. Select a volume that's at least 7 GB. If the volume isn't empty, click Options, select "Erase and Install," and then click OK. Click Continue.
5. In Installation Type, click Customize, deselect all checkboxes, and then click Install.

   If the volume is very close to 7 GB in size, the Installer might automatically load the Customize list.

   When the Installer finishes installing Mac OS X Server, the computer restarts and the Mac OS X Server setup assistant opens.
6. In the Server Configuration step of the setup assistant, select Advanced.
7. Continue through the setup assistant and enter information as requested. Don't enable any services.

   When you finish entering information in the setup assistant, the login window appears.
8. Log in with the user name "root" and the password of the user you created in the setup assistant.

   You must set up and run AXD Mac OS X tools as root. Otherwise, you won't be able to test the Xserve you've installed AXD Mac OS X tools on.
9. Insert the *Admin Tools* disc.

   If you have a disc image of the *Admin Tools* disc, double-click the .dmg file to mount the disc image.
10. Open the Finder and drag the AXD.app file from /AppleXserveDiagnostics/ on the *Admin Tools* disc to the /Applications/ folder.
11. If you're setting up a client Xserve, open the Finder, select the /Applications/ folder, and choose New Folder from the Action (gear) pop-up menu. Name the folder AXDClient.

    Client Xserve computers are remotely controlled by host computers.

12 Open System Preferences (located in /Applications/). Change the following options in System Preferences panes.

System Preferences pane	Recommended configuration
Accounts	Select the System Administrator account, and click Login Items. Click Add (+), select /Applications/AXD.app, and click Add.
CDs & DVDs	In all pop-up menus, choose Ignore.
Desktop & Screen Saver	In the Screen Saver pane, drag the "Start screen saver" slider to Never.
Energy Saver	In the Sleep pane, drag both sliders to Never, and deselect "Put hard disk(s) to sleep when possible."
Exposé and Spaces	In the Exposé pane, in all pop-up menus, choose "–." In the Spaces pane, deselect Enable Spaces.
Software Update	In the Scheduled Check pane, deselect "Check for updates."

If you can't change settings in System Preferences, click the lock button and authenticate.

After installing the AXD Mac OS X tools, you must log in as root to run AXD tools to test your own Xserve. If you don't log in as root, AXD Mac OS X tools enters host mode and waits for a connection to a client Xserve to control.

Starting Up AXD Tools

3

This chapter describes several methods that let you change the startup disk to the volume with AXD tools installed.

Before you start up AXD tools, make sure you've properly installed and configured the tools. For more information, see Chapter 2, "Setup and Installation," on page 10.

Changing the Startup Disk

AXD tools is usually installed on a dedicated volume to minimize the risk of server processes interrupting the tests. Because of this, you'll need to change the startup disk to the volume with AXD tools installed before you can use the tools.

If you want to test a client Xserve remotely, you'll need to first start up AXD tools on the host computer, and then start up AXD tools on the client Xserve.

To start up AXD tools, set the startup volume of the Xserve to the volume or disk image containing AXD tools. If Mac OS X Server starts up by default on your Xserve, you can change the startup disk in the Startup Disk pane of System Preferences. Otherwise, you can temporarily change the startup disk by pressing and holding one of several keys when starting up the Xserve:

Goal	Press and hold this key at Xserve startup
Choose the AXD tools volume before starting up Mac OS X	Option
Start up the AXD EFI tools located on the *Admin Tools* disc	D (make sure the *Admin Tools* disc is inserted)
Start up using the AXD EFI tools disk image from a NetBoot server	F1 or a specific combination of the Xserve front panel buttons

The Startup Disk pane of System Preferences can start up AXD Mac OS X tools, but not AXD EFI tools. You can press the Option key at startup to start up either AXD EFI tools or AXD Mac OS X tools.

The Xserve becomes unavailable whenever you use AXD tools. Before starting tests, alert your users that the server will be unavailable.

Changing the Startup Disk in System Preferences

If Mac OS X Server starts up by default on your Xserve, you can use System Preferences to change the startup disk. The list of startup volumes includes internal volumes and connected portable storage device volumes.

When you change the startup disk in System Preferences, you can't select a startup disk with AXD EFI tools installed. To change the startup disk to the volume with AXD EFI tools installed, change the startup disk at startup. For more information, see "Changing the Startup Disk Temporarily at Startup" on page 19.

To change the startup disk in System Preferences:

1. Open System Preferences on the Xserve, and then select Startup Disk.
2. If the lock icon is locked, click it, and then authenticate as a system administrator.
3. Select the startup disk with the AXD tools and click Restart.

When you're done using AXD tools, change the startup disk back to the volume you were using previously.

Changing the Startup Disk Using the Command-Line Interface

If Mac OS X Server starts up by default on your Xserve, you can use the command-line interface to change its startup disk. You can use the command-line interface to start up from internal volumes and connected portable storage device volumes.

You can also change the startup disk of a remote server using the command-line interface. Remote login must be enabled on the remote server (enabled by default). You can enable remote login in the Sharing pane of System Preferences.

When you change the startup disk using the command-line interface, you can't select a startup disk with AXD EFI tools installed. To change the startup disk to the volume with AXD EFI tools installed, change the startup disk at startup. For more information, see "Changing the Startup Disk Temporarily at Startup" on page 19.

You'll need to be able authenticate as the root account to change the startup disk in the command-line interface.

Note: The Terminal commands described in this task are case-sensitive and must be entered as shown.

To change the startup disk using the command-line interface:

1. Open Terminal (located in /Applications/Utilities/).
2. If you want to connect to a remote server, enter the following in the Terminal window, and authenticate when requested:

   ```
   ssh username@serveraddress
   ```

   Replace *username* with the short name of a user who can authenticate as the root account on the server. Replace *serveraddress* with the URL, IP address, or host name of the server.
3. Enter the following, and authenticate as the root account when requested:

   ```
   sudo bless -folder "/Volumes/volumename/System/Library/CoreServices"
        -setBoot
   ```

   Replace *volumename* with the name of the volume you want to start up from.

   When you're done using AXD tools, change the startup disk back to the volume you were using previously.

Changing the Startup Disk Using Apple Remote Desktop

If you have Apple Remote Desktop, you can change the startup disk of remote computers to an internal volume or connected portable storage device volume.

For information about using Apple Remote Desktop to set a computer's startup disk, see *Apple Remote Desktop Administrator's Guide,* located at:

www.apple.com/remotedesktop

Changing the Startup Disk Temporarily at Startup

If your Xserve has trouble starting up Mac OS X Server or doesn't Mac OS X Server installed, you can temporarily change the startup disk by pressing and holding a key while the Xserve is starting up. This method requires that you have a keyboard and mouse attached to the Xserve and that you can restart the Xserve.

If you don't have a keyboard and mouse attached to the Xserve, use the instructions in the next section, "Starting Up an AXD EFI Tools NetBoot Image Using the Xserve Front Panel."

If a firmware password is set, you can't temporarily change the startup disk by pressing and holding the D or F1 key. You can do it by pressing and holding the Option key, but you must authenticate with the firmware password.

For information about disabling the firmware password, see "Disabling the Firmware Password" on page 22.

To temporarily change the startup disk at startup:

1. Restart the Xserve.
2. While the Xserve is restarting, press and hold the Option key until a list of volumes appears. If you're asked to authenticate, enter the firmware password and click the Continue (right-arrow) button.

   If you have the *Admin Tools* disc inserted, you can start up using AXD EFI tools located on the disc by pressing and holding the D key instead of the Option key.

   If you want to start up AXD EFI tools from a NetBoot image hosted on a NetBoot server, press and hold the F1 key instead of the Option key.

   Each of these alternatives immediately starts up AXD EFI tools and bypasses the list of volumes described in the next step.
3. If you displayed the list of volumes instead of immediately starting up AXD tools, select the volume with AXD tools, and then click the arrow button to start up.

   The AXD EFI tools volume is listed as EFI Boot.

   After you're done using AXD EFI tools and restart the Xserve, it starts up from the default startup volume.

Starting Up an AXD EFI Tools NetBoot Image Using the Xserve Front Panel

You can use the Xserve front panel buttons to start up an AXD EFI tools disk image hosted by a NetBoot server. This technique is useful for situations where your Xserve:

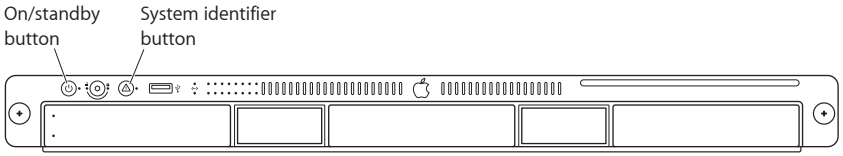
- Doesn't have a monitor or keyboard attached
- Doesn't respond to keyboard input
- Doesn't have Mac OS X Server installed

The Xserve must be on the same subnet as the NetBoot server hosting the AXD EFI tools disk image.

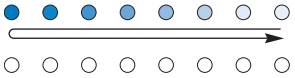
If the Xserve EFI requires a password, you won't be able to start up a NetBoot image using the front panel. You'll need to disable the firmware password before you can use the front panel. To disable the password, you must be able to start up Mac OS X Server on the Xserve.

To use the Xserve front panel to start up an AXD EFI tools NetBoot image:

1. Turn off the Xserve.
2. Press and hold the system identifier button and press the on/standby button.



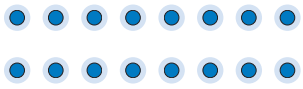
3. Continue holding the system identifier button until the top row of lights blink right to left. Release the system identifier button.



Top row of lights blink right to left, then left to right.

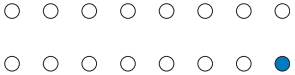
If the two rows of lights on the front panel blink once and the Xserve resumes its startup sequence, a firmware password is enabled. You'll need to disable the password.

For information about disabling the firmware password, see the next section, "Disabling the Firmware Password."



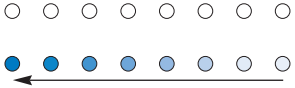
Both rows of lights blink once. Disable the firmware password.

4. When you release the system identifier button, the lower-right light should turn on.



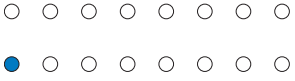
Lower-right light comes on.

5. Press the system identifier button again. The lights in the bottom row should now be blinking right to left.



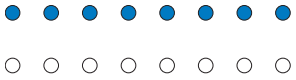
Bottom row of lights blinks right to left.

6. Press the button repeatedly until the lower-left light turns on.



Lower-left light comes on.

7 When the lower-left light is on, press and hold the system identifier button until all the lights in the top row are on. Release the system identifier button.



Top row of lights comes on.

When you release the button, the Xserve starts up from the AXD EFI tools NetBoot disk image.

After you run AXD EFI tools and restart, the Xserve starts up from its default startup volume.

Disabling the Firmware Password

If a firmware password is enabled, you can't:

- Start up from an AXD EFI tools NetBoot image using the Xserve front panel
- Temporarily change the startup volume by pressing and holding F1 or D at startup

If a firmware password is enabled and you try to temporarily change the startup volume by pressing and holding Option at startup, you must authenticate.

To disable the firmware password:

1 Insert the *Mac OS X Server Install DVD*.

2 Open the Install Mac OS X Server application, click Restart, and authenticate, if requested.

The computer restarts and opens the Mac OS X Server Installer.

3 After selecting a language, choose Utilities > Firmware Password Utility.

4 In Firmware Password Utility, click Change.

5 Deselect "Require password to change firmware settings," and click OK. Authenticate when asked.

6 Choose Firmware Password Utility > Quit Firmware Password Utility.

7 Choose Mac OS X Installer > Quit Mac OS X Installer. Click Startup Disk, select the startup disk with Mac OS X Server installed, and then click Restart.

Using AXD Tools

4

AXD Mac OS X tools and AXD EFI tools have different interfaces and functionality. This chapter describes how to use both sets of AXD tools.

Before you can use AXD tools, make sure you've properly started up the tools. For more information, see Chapter 3, "Starting Up AXD Tools," on page 17.

Setting AXD to Host, Client, or Local Mode

AXD tools can start up in any of three modes, depending on whether:

- You're opening AXD EFI tools or AXD Mac OS X tools
- Any of the computers on the same subnet are host computers
- A host computer is directly connected
- You're logged in as root
- You're running AXD Mac OS X tools on a computer that isn't an Intel-based Xserve

The following table describes the three modes:

Mode	Description	Automatically enters mode if
Host	The computer searches for Xserve computers that are on the same subnet and start AXD tools in remote mode. When one is found, the host computer controls AXD tools on the client Xserve.	You run AXD Mac OS X tools and either: • The computer isn't an Intel-based Xserve • You're not logged in as root
Client	The Xserve can be controlled by a host computer.	You're running AXD EFI tools and a host computer is on the same subnet or is directly connected.
Local	The Xserve runs all tests locally.	You're running AXD EFI tools and a host computer isn't on the same subnet and isn't directly connected.

If you're logged in as root on an Intel-based Xserve, and then you run AXD Mac OS X tools, you can choose which mode to enter.

Remotely Testing a Client Xserve

If you want to test a client Xserve, you must first start up AXD tools on the host computer, set it to connect to a client Xserve, and then start up the AXD tools on the client Xserve and set it to be a client of a remote host.

The host computer must run AXD Mac OS X tools. The client Xserve can run AXD EFI tools or AXD Mac OS X tools. The available tests are based on which AXD tools the client Xserve is running.

When you start up AXD EFI tools, the Xserve first looks for a host computer. If it finds a host computer, the Xserve enters client mode. If it doesn't find a host computer, the Xserve enters local mode.

When you start up AXD Mac OS X tools, the Xserve automatically becomes a host computer if either of the following are true:

- You logged in to Mac OS X with an account that isn't root.
- You are running AXD Mac OS X tools on a computer that isn't an Intel-based Xserve.

If AXD Mac OS X tools doesn't automatically become a host computer, it asks if it should connect to a client Xserve, be a client of a remote host, or run tests locally.

To remotely test a client Xserve:

1 On the host computer, open AXD Mac OS X tools (located in /Applications/).

2 If the host computer is an Intel-based Xserve and you're logged in as root, when AXD Mac OS X tools opens, a dialog asks you to choose which mode to enter. Choose "Connect to remote Xserve" and click OK.

   If your computer isn't an Intel-based Xserve, the dialog doesn't appear, and AXD Mac OS X tools automatically enters host mode.

3 On the client Xserve, change the startup disk to a volume with AXD tools and restart it.

   You can also temporarily change the startup disk to either a volume with AXD tools on it or to an AXD tools NetBoot disk image when you start up the Xserve.

   For more information about how to change or temporarily change the startup volume, see Chapter 3, "Starting Up AXD Tools," on page 17.

4 If you're starting up AXD Mac OS X tools, log in as root, and if AXD Mac OS X tools doesn't open automatically, open the AXD application (located in /Applications/). Choose "Client of a remote host," and then click OK.

5 If you're starting up AXD EFI tools, the Xserve automatically enters client mode.

   There are several ways to determine whether the host computer and client Xserve have established a successful connection:

   - The IP address field in the AXD window on the host computer should match the IP address assigned to the client Xserve.
   - The name of the AXD window on the host computer is "AXD remote log," not "AXD local log."
   - The log area of the client Xserve uses more of the AXD window. Shut Down, Restart, and a few other buttons are removed.

Testing the Local Xserve Using AXD EFI Tools

To test the local Xserve, make sure none of the computers on the same subnet as the Xserve is running AXD Mac OS X tools in host mode. If a computer on the same subnet is running AXD Mac OS X tools in host mode, the Xserve automatically enters client mode.

To test the local Xserve using AXD EFI tools:

- Restart the Xserve and press and hold a key, or use the Xserve front panel buttons to start up the volume or NetBoot disk image with AXD EFI tools.

  For more information about how to temporarily change the startup volume while starting the computer, see Chapter 3, "Starting Up AXD Tools," on page 17.

  When AXD EFI tools starts up and doesn't find a host computer, it enters local mode.

Testing the Local Xserve Using AXD Mac OS X Tools

To test the local Xserve, you must log in as root. If you don't log in as root, AXD Mac OS X tools automatically enters host mode.

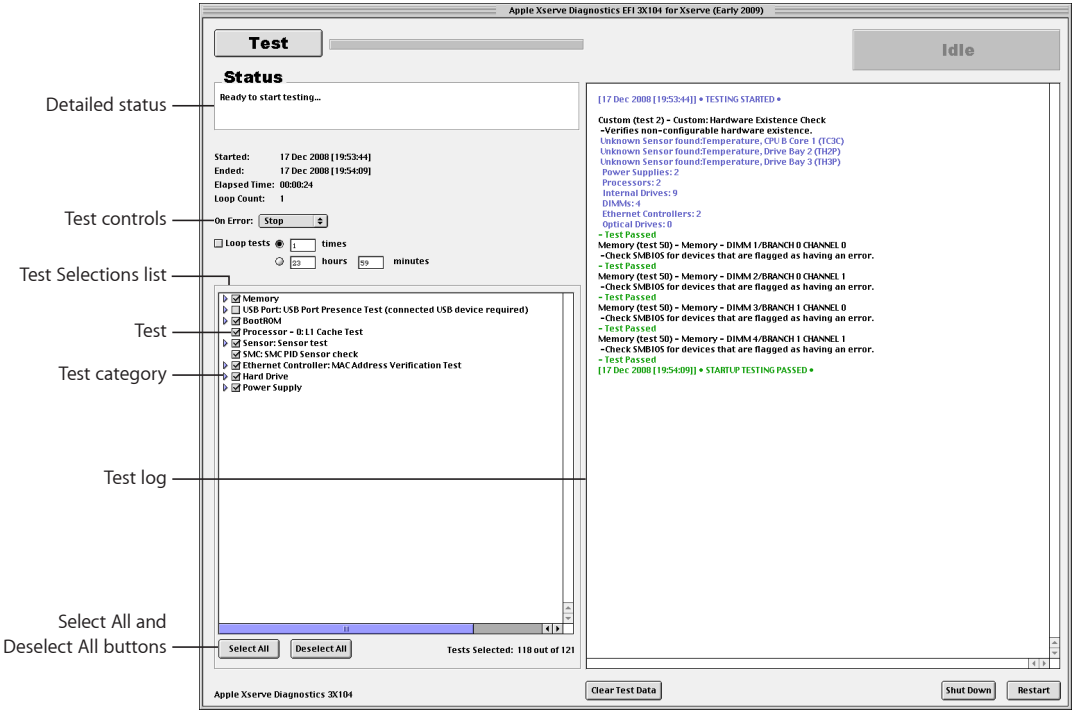
To test the local Xserve using AXD Mac OS X tools:

1. Change the startup disk of the Xserve to a volume with AXD Mac OS X tools, restart it, and log in as root.
2. If AXD Mac OS X tools doesn't open automatically, open it (located in /Applications/).
3. When AXD Mac OS X tools opens, choose "Local" from the dialog that appears and click OK.

Using AXD EFI Tools

In AXD EFI tools, the test controls and test selections are split across two panes. Regardless of which pane you're looking at, you can do the following:

- View the test log, test settings, and status
- Start tests
- Clear the test log
- Restart the Xserve
- Shut down the Xserve



For information about AXD EFI tools, see the following topics:

- "Customizing AXD EFI Tools Test Settings" on page 27
- "Clearing the Test Log" on page 28

- "Viewing the Hardware Profile" on page 28
- "Shutting Down or Restarting the Xserve" on page 28
- "Viewing Saved Logs" on page 28
- "Taking Screen Shots" on page 29

Customizing AXD EFI Tools Test Settings

You can customize AXD test settings in several ways by choosing which tests are run, whether to loop tests, and whether to stop or continue testing when an error occurs.

To customize AXD EFI tools test settings:

1 In AXD EFI tools, select the test settings you want.

To do this	Do this
Choose which tests are run	Do any of the following: • To select a test, select the checkbox next to the test. • To select a specific test within a category of tests, click the disclosure triangle next to the category, and then select individual tests. • To select all tests, click Select All. • To remove all tests, click Deselect All.
Loop all selected tests	Do one of the following: • To loop all selected tests a specific number of times, select "Loop # times" and replace # with the number of times to loop. • To run all tests once, select "Loop # times" and replace # with the number 1. • To loop all tests for a specific amount of time, select "Loop for # hours and # minutes" and replace # with number of hours and minutes to loop. When the specified time is reached, the current loop must complete before the tests stop. For example, if one loop of your test set takes 2 hours to complete, and your specified time is 3 hours, AXD stops testing in 4 hours. (Instead of stopping at 3, it waits for the current test set loop to complete before stopping.)
Change what to do when an error occurs	In the On Error pop-up menu, do one of the following: • To stop testing when the first error occurs, choose Stop. • To continue testing when errors occur, choose Continue.

2 To run the test, click Test.

Clearing the Test Log

The test log contains all test messages that have occurred during the current AXD session. If you quit AXD, the log is cleared.

To clear the test log without quitting AXD, click Clear Test Data.

Viewing the Hardware Profile

The hardware profile lists all hardware components in the Xserve.

You can view the hardware profile by choosing Hardware Profile > Display Hardware Profile.

Shutting Down or Restarting the Xserve

You can shut down or restart the Xserve in AXD EFI tools.

To shut down or restart the Xserve, click Shut Down or Restart.

Viewing Saved Logs

Whenever you start AXD EFI tools, it automatically creates a log of its test results in the /AXDLogs folder of the volume with AXD EFI tools installed. This log is continually updated as tests complete. If the Xserve crashes during tests, you can review the log to see which test it crashed on.

If you run AXD EFI tools from the *Admin Tools* disc, NetBoot disc image, or from a volume that is not in MS-DOS (FAT) format, logs are not saved. For more information about formatting volumes, see "Setting Up a Storage Device for AXD Tools Installation" on page 12.

The logs are named:

AXD_*date*_*time*_*serialnumber*.txt

The *date* and *time* indicate when AXD EFI tools was started. The time is in Greenwich Mean Time (GMT) using a 24-hour clock format.

The values use this format:

Value	Format	Example
date	DDMonYear	15Jul2007
time	HH_MM_SS	19_23_46
serialnumber	###########	AB12345CD6E

Taking Screen Shots

You can take screen shots of AXD EFI tools, which are saved as BMP files in the root folder of the volume with AXD EFI tools installed.

If you run AXD EFI tools from the *Admin Tools* disc, NetBoot disc image, or from a volume that is not in MS-DOS (FAT) format, you can't take screen shots. For more information about formatting volumes, see "Setting Up a Storage Device for AXD Tools Installation" on page 12.

To take a screen shot:

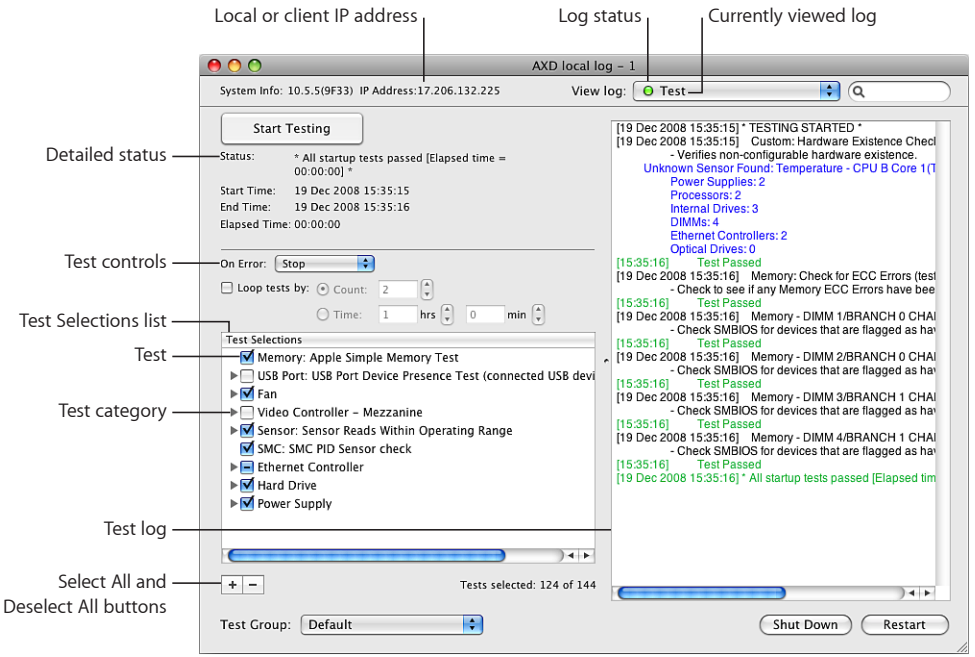
- In AXD EFI tools, press Command-Shift-3.

After pressing Command-Shift-3, the system pauses for a few seconds to take the screen shot.

Using AXD Mac OS X Tools

AXD Mac OS X tools changes based on whether you're running it locally, as a client, or as a host. In client mode, you can't change test settings, select different tests, or shut down or restart the Xserve. Therefore, the test log uses most of the window.

In local and host mode, you can access all AXD Mac OS X features in the main window.



For information about using AXD Mac OS X Tools, see the following topics:

- "Customizing AXD Mac OS X Tools Test Settings" on page 30
- "Working with Test Groups" on page 31

- "Viewing Logs" on page 32
- "Setting Log Preferences" on page 33
- "Shutting Down or Restarting the Xserve" on page 34
- "Quitting AXD Mac OS X Tools While a Test is Running" on page 34

Customizing AXD Mac OS X Tools Test Settings

You can customize AXD test settings in several ways by choosing which tests are run, whether to loop tests, and whether to stop or continue testing when an error occurs.

To customize AXD Mac OS X tools test settings:

1 In AXD Mac OS X tools, select the test settings you want.

To do this	Do this
Choose which tests are run	In the Test Selections list, do the following: • To select a test, select the checkbox next to the test. • To select a specific test within a category of tests, click the disclosure triangle next to the category, and then select individual tests. • To select all tests, click the Select All (+) button. • To remove all tests, click the Deselect All (–) button.
Loop all selected tests	Select "Loop tests by," and then do the following: • To loop all selected tests a specific number of times, select Count and enter a number of times to loop. • To loop all selected tests for a specific amount of time, select Time and enter the number of hours and minutes to loop. When the specified time is reached, the current loop must complete before the tests stop. For example, if one loop of your test set takes 2 hours to complete and your specified time is 3 hours, AXD Mac OS X tools stops testing in 4 hours. (Instead of stopping at 3, it waits for the current test set loop to complete before stopping.)
Change what to do when an error occurs	In the On Error pop-up menu, do the following: • To stop testing when the first error occurs, choose Stop. • To continue testing when errors occur, choose Continue.

2 To save your customized test settings for future use, in the Test Group pop-up menu, choose Save Current Group. Enter a name for the group and click OK.

For more information, see the next section, "Customizing AXD Mac OS X Tools Test Settings."

3 To run the test, click Start Testing.

4 When the test completes, a PASSED or FAILED message appears on screen. Click anywhere to close the message.

If you stop the test before it completes, no message appears.

Working with Test Groups

You can create test groups based on your customized test settings. These are similar to templates because they allow you to reuse your test settings without having to change each setting individually. After choosing a test group, you can still change its settings.

There are several test groups included with AXD Mac OS X tools. These test groups stop when an error occurs, and they aren't looped.

Test group	Test selections
Default	All memory, fan, hard drive, sensor, SMC PID sensor, and power supply tests. Ethernet MAC address verification and ROM checksum verification.
Quick Test	All sensor tests.

You can also export a test group to a file. By exporting a test group, you can use that file to re-create that test group on other AXD installations. For example, if you install AXD Mac OS X tools on several Xserve computers, you can copy the test group file to each of them, making identical tests available without having to manually create a new test group.

To work with test groups:

- In AXD Mac OS X tools, choose the options you want.

To do this	Do this
Use a test group	In the Test Group pop-up menu, choose a test group.
Create a new test group	In the Test Group pop-up menu, choose Save Current Group. Enter a name for the group and click OK.
Delete a test group	In the Test Group pop-up menu, choose a test group. Choose Edit > Delete Test Group. You can't delete the Default or Quick Test test groups.
Export a test group	Choose File > Export Test Group, choose a location, name the test group, and click Save.
Import a test group	Choose File > Open, select an .axdconfig file, and click Open.

Viewing Logs

You can view the following types of logs in AXD Mac OS X tools:

Log type	Description
Test	All messages from tests run in the current AXD Mac OS X tools session.
Hardware Info	Listing and description of all installed hardware.
System	All of the logs that are also available in System Profiler (located in /Applications/Utilities/)

You can also view logs stored on other volumes. This is useful for:

- Starting up AXD Mac OS X tools from a USB drive or a disc, and viewing logs stored on the Xserve startup volume
- Diagnosing issues that you run into while you're not using AXD tools

When you view logs in AXD Mac OS X tools, a colored circle next to the log name indicates whether the log is able to be loaded.

Color	Status
No circle	You haven't loaded the log during this AXD session, or the log hasn't been created yet.
Yellow	The log didn't load. This usually occurs when there isn't any data in the log.
Green	The log loaded.

To view logs:

1. Open AXD Mac OS X tools.
2. If tests are currently running, wait for them to complete or stop them.

   If tests are running, you can view only the test log.
3. Do any the following:

To do this	Do this
Choose a different volume to view logs on	Choose Logs > View Different System's Logs, choose a volume from the "Volume to gather system logs from" pop-up menu, and click OK.
View logs in the current or chosen volume	Choose a log from the "View log" pop-up menu.
Search for specific text within the log	Enter text in the search field. When you press Return, matching text is highlighted in the log area.

To do this	Do this
Clear logs	Choose Logs > Clear *current* Log, or choose Logs > Clear All Logs. The name of the currently viewed log replaces *current*.
Refresh logs	Choose Logs > Refresh Current Log, or choose Logs > Refresh All Information Logs.

Setting Log Preferences

You can set up log preferences so that the AXD test logs are automatically saved to a file at a location you choose. AXD test logs are created every time you start a new AXD session.

When AXD Mac OS X tools saves a log, it overwrites any existing log of the same name. Log preferences can automatically customize the name of the log file so that the log files aren't overwritten.

If you don't use any of the naming options, the log is saved as:

AXD_*serialnumber_mode*_autosave_log.txt

If you are testing locally, *mode* is replaced by "local." If you are testing remotely, *mode* is replaced by "remote."

If you use all of the naming options, the log is saved as:

AXD_*serialnumber_mode*_autosave_log_*date_ethernetaddress uniquename*.txt

The appended values use this format:

Value	Format	Example
date	DD_Mon_Year	15_Jul_2007
ethernetaddress	##_##_##_##_##_##	01_23_45_67_89_ab
uniquename	- #	- 1

The unique name will be appended only if a file of the same name exists.

A log for the local Xserve with all naming options enabled (using the example values) is saved as:

AXD_AB12345CD6E_local_autosave_log_15_Jul_2007_01_23_45_67_89_ab - 1.txt

To set log preferences:

1. In AXD Mac OS X tools, choose AXD > Preferences.
2. To automatically save test logs, select "Auto-save test log."

   If you don't select this option, you can't perform the steps that follow.
3. To choose the location of the automatically saved log, click "Choose auto-save location," select a location, and then click Open.
4. Configure the test log naming options.

To do this	Do this
Ensure newly created log files don't overwrite old log files	Select "Use unique name."
Append the Ethernet address of the Xserve that's being tested	Select "Append Ethernet Address."
Append the run time and date of the session's first tests	Select "Append time and date."

Shutting Down or Restarting the Xserve

If you're running AXD Mac OS X tools on the local Xserve, or on a host computer, you can shut down or restart the Xserve. To do so, click Shut Down or Restart.

If the Xserve is in client mode, you can't shut down or restart the Xserve locally.

Quitting AXD Mac OS X Tools While a Test is Running

If you try to quit AXD Mac OS X tools while a test is running, you won't be able to print or save any logs from the current AXD session. Make sure you print or save any critical logs before quitting.

Instead of quitting in the middle of a test, you can stop the current test, print or save logs, and then quit.

AXD Tools Test Reference

This reference describes all the tests available in AXD tools and gives estimates for how long the tests take to complete.

The types of tests available depend on if you're using AXD EFI tools or AXD Mac OS X tools, and on your Xserve model and configuration.

Comparison of Available Tests

The following table compares the tests available by component, depending on if you're using AXD EFI tools or AXD Mac OS X tools. For more information about the specific tests available for each component, see "AXD EFI Tools Tests" on page 37 and "AXD Mac OS X Tests" on page 43.

A ✓ indicates that a test is available, and a blank entry indicates that there are no tests available:

Component tested	Available in AXD EFI tools	Available in AXD Mac OS X tools	Notes
Boot ROM	✓		
Ethernet controller	✓	✓	Different tests are available depending on the tool.
Fan		✓	

Component tested	Available in AXD EFI tools	Available in AXD Mac OS X tools	Notes
Hard drive	✓	✓	Different tests are available depending on the tool.
Memory (simple)	✓	✓	In AXD EFI tools, this tests only the first 2.5 GB of memory using a single CPU core. In AXD Mac OS X tools, this tests all memory using a single CPU core.
Memory (multicore)	✓	✓	In AXD EFI tools, this tests the first 2.5 GB of memory using all available CPU cores. In AXD Mac OS X tools, this tests all memory using all available CPU cores.
Memory (extended)	✓		Tests all memory.
Memory (SMBIOS)	✓	✓	Tests if memory has been mapped out correctly.
Memory (ECC)		✓	Tests for memory ECC errors.
Power supply	✓	✓	
Sensor	✓	✓	AXD Mac OS X tools has an additional sensor test.
SMC PID sensor	✓		
USB port	✓	✓	
Video controller	✓	✓	AXD Mac OS X tools has more tests than AXD EFI tools.

AXD EFI Tools Tests

These tests are available if your Xserve is running AXD EFI tools.

Startup Tests

These tests run automatically when you start up AXD EFI tools.

SMBIOS tests check to see if bad memory was detected and mapped out at Xserve startup. When the Xserve tests memory at start up, it automatically maps out bad memory. Mac OS X doesn't see this mapped-out memory, so the non-SMBIOS memory tests don't test it. The SMBIOS test reports these mapped-out DIMMS.

When an ECC error occurs, memory catches the problem and and fixes it. When you run other memory tests, the tests don't realize an error has occurred. The ECC tests detect these memory fixes and report them.

Test	Estimated completion time	Description
Hardware Existence	1 second	Compares a table of sensors and fans with what is connected to the logic board. If a sensor or fan isn't found, an error occurs. All sensors found can be individually tested using sensor tests.
SMBIOS Self-Test	1 second	Checks the SMBIOS tables for 32-bit errors (type 18) and 64-bit errors (type 33). Also verifies that the mapped-in DIMM size is appropriate for the slot it's inserted into. If there's a size mismatch, an error occurs.
ECC Error Count	1 second	Reports the number of ECC errors, and then resets the count.

Boot ROM Tests

Test	Estimated completion time	Description
Boot ROM Checksum	1 second	Verifies the Boot ROM checksum.
Boot ROM FW GUID MAC Addr Checksum	1 second	Verifies the Boot ROM FireWire GUID MAC address checksum.

Ethernet Controller Tests

The availability of Ethernet controller tests depends on the Enternet controller installed in the Xserve.

Test	Estimated completion time	Description
MAC Address Verification	1 second	Verifies MAC address isn't all FFs or 00s.
PCI-E 1 LinkWidth Verification	1 second	Verifies PCI link width is 1.
PCI-E 2 LinkWidth Verification	1 second	Verifies PCI link width is 2.
PCI-E 4 LinkWidth Verification	1 second	Verifies PCI link width is 4.
PCI-E 2.5G Link Speed Verification	1 second	Verifies PCI link speed is 2.5G.

Hard Drive Tests

When AXD EFI tools starts, it performs a hardware existence test. All hard drives found during this test can be tested individually using hard drive tests.

Test	Estimated completion time	Description
Full Read	21 minutes for an 80 GB drive; 3 hours for a 1 TB drive	Performs a DMA full-read scan at 1250 RPM. This checks the entire hard drive for slow-read failures. This test is available for hard drives, not solid-state drives.
Abbreviated Read	1 minute	Performs a DMA scan at 1250 RPM. This checks the first 10 GB of the hard drive for slow-read failures. This test is available for hard drives, not solid-state drives.

Memory Tests

All memory tests are listed under Memory. These tests are described here.

Simple Memory Tests

Simple memory tests test the first 2.5 GB of memory. To test all memory, run extended memory tests.

Even though simple memory tests don't test all memory, run these tests to detect intermittent memory issues.

In AXD EFI tools, all memory tests (simple, multicore, and extended) are grouped under Memory tests.

Note: The time required to complete memory tests correlates to the size of memory being tested. These estimates are based on testing 1 GB of memory.

Test	Estimated completion time	Description
Address as Data	5 seconds	Tests memory using the memory address as data.
Patterns	25 seconds	Tests memory using different data patterns.
Marching Ones and Zeros	15 seconds	Tests memory by walking 1s and 0s up and down memory.
Knaizuk Hartmann	10 seconds	Tests memory using this algorithm.
MOD3	30 seconds	Tests memory using this algorithm.
March U	2 minutes	Tests memory using this algorithm.
Random	15 seconds	Uses pseudo-random values.
Block Checkerboard 32	10 seconds	Alternates 32-bit words with all 1s and all 0s, and then with all 0s and all 1s.
Bit Checkerboard 32	10 seconds	Alternates bits with all 1s and all 0s, and then with all 0s and all 1s.
Sequential Byte Block 32	14 minutes	Fills all bytes sequentially with patterns starting at 0x00 and ending at 0xFF.
Walking One 32	5 minutes	Walks 1s up and down memory.
Walking Zero 32	5 minutes	Walks 0s up and down memory.

Test	Estimated completion time	Description
Walking Spread Bit 32	5 minutes	Walks 0b01 up and then walks 0b10 down memory.
Walking Bit Flip 32	5 minutes	Alternates words with walking 1 and walking 0, and then alternates with walking 0 and walking 1.

Multicore Memory Tests

Multicore memory tests test the first 2.5 GB of memory using all available CPU cores.

In AXD EFI tools, all memory tests (simple, multicore, and extended) are grouped under Memory tests.

Note: The time required to complete memory tests correlates to the size of memory being tested. These estimates are based on testing 1 GB of memory.

Test	Estimated completion time	Description
MP Block Checkerboard 32	5 seconds	Alternates 32-bit words with all 1s and all 0s, and then with all 0s and all 1s.
MP Bit Checkerboard 32	5 seconds	Alternates bits with all 1s and all 0s, and then with all 0s and all 1s.
MP Sequential Byte Block 32	8 minutes	Fills all bytes sequentially with patterns starting at 0x00 and ending at 0xFF.
MP Walking One 32	2 minutes	Walks 1s up and down memory.
MP Walking Zero 32	2 minutes	Walks 0s up and down memory.
MP Walking Spread Bit 32	2 minutes	Walks 0b01 up and then walks 0b10 down memory.
MP Walking Bit Flip 32	2 minutes	Alternates words with walking 1 and walking 0, and then alternates words with walking 0 and walking 1.
Check Hardware Errors	1 second	Tests specific registers for memory related errors. Running this test at the end of memory testing may help catch memory errors generated during other memory tests.

Extended Memory Tests

Extended memory tests test all available memory.

In AXD EFI tools, all memory tests (simple, multicore, and extended) are grouped under Memory tests.

The availability of extended memory tests depends on the Xserve model you test.

Note: The time required to complete memory tests correlates to the size of memory being tested. These estimates are based on testing 1 GB of memory.

Test	Estimated completion time	Description
Extended Memory Test P00F	5 seconds	Tests memory using pattern 0. This fails if an error occurs.
Extended Memory Test P01F	5 seconds	Tests memory using pattern 1. This fails if an error occurs.
Extended Memory Test P02F	5 seconds	Tests memory using pattern 2. This fails if an error occurs.
Extended Memory Test P03F	5 seconds	Tests memory using pattern 3. This fails if an error occurs.
Extended Memory Test P04F	5 seconds	Tests memory using pattern 4. This fails if an error occurs.
Extended Memory Test P05F	5 seconds	Tests memory using pattern 5. This fails if an error occurs.
Extended Memory Test P06F	5 seconds	Tests memory using pattern 6. This fails if an error occurs.
Extended Memory Test P07F	5 seconds	Tests memory using pattern 7. This fails if an error occurs.

SMBIOS Memory Tests

Test	Estimated completion time	Description
SMBIOS Self-Test	1 second	Checks the SMBIOS tables for 32-bit errors (type 18) and 64-bit errors (type 33). Also verifies that the mapped-in DIMM size is appropriate for the slot it's inserted into. If there's a size mismatch, an error occurs.

Power Supply Tests

Test	Estimated completion time	Description
Good	1 second	Checks if the power supply's good bit is set. If it's not set, this could indicate that the power supply isn't seated well or is bad, or that there's no AC connected.
Quick	5 seconds	This is available only if you have more than one power supply. This turns off the redundant power supplies so that only one power supply is used.

Processor Tests

Test	Estimated completion time	Description
L1 Cache Test	1 second	Verifies that the L1 cache is good on all processor cores.

Sensor Tests

When AXD EFI tools starts, it performs a hardware existence test. All sensors found during this test can be tested individually using sensor tests.

Test	Estimated completion time	Description
Sensor Reads	1 second	Verifies that the sensor reads are within the preset sensor limits.

SMC PID Sensor Tests

The System Management Controller (SMC) monitors the Proportional Integral Derivative (PID) controller which controls several important temperature sensors.

Test	Estimated completion time	Description
SMC PID Sensor	1 second	Verifies that the sensor reads controlled by the PID are within the preset sensor limits.

USB Tests

Connect USB devices before running USB tests.

Test	Estimated completion time	Description
Presence	1 second	Verifies that a USB device is connected.

Video Controller Tests

The availability of video controller tests depends on the video controller installed in the Xserve.

Test	Estimated completion time	Description
PCI-E 8 LinkWidth Verification	1 second	Verifies PCI link width is 8.
Framebuffer Address as Data	2 minutes	Tests the framebuffer using framebuffer addresses as data.

AXD Mac OS X Tests

These tests are available if your Xserve is running AXD Mac OS X tools.

Startup Tests

These tests run automatically when you start up AXD Mac OS X tools.

SMBIOS tests check to see if bad memory was detected and mapped out at Xserve startup. When the Xserve tests memory at start up, it automatically maps out bad memory. Mac OS X doesn't see this mapped out memory, so the non-SMBIOS memory tests don't test it. The SMBIOS test reports these mapped out DIMMS.

When an ECC error occurs, memory catches the problem and and fixes it. When you run other memory tests, the tests don't realize an error has occurred. The ECC tests detect these memory fixes and report them.

Test	Estimated completion time	Description
Hardware Existence	1 second	Compares a table of sensors and fans with what is connected to the logic board. If a sensor or fan isn't found, an error occurs. All sensors, fans, and hard drives found can be individually tested using sensor, fan, hard drive tests.
SMBIOS Self-Test	1 second	Checks the SMBIOS tables for 32-bit errors (type 18) and 64-bit errors (type 33). Also verifies that the mapped-in DIMM size is appropriate for the slot it's inserted into. If there's a size mismatch, an error occurs.
ECC Error Count	1 second	Reports the number of ECC errors, and then resets the count.

Ethernet Controller Tests

The availability of Ethernet controller tests depends on the Enternet controller installed in the Xserve.

Data loop tests can add to network traffic. Consider disconnecting from the network before running the data loop tests.

Test	Estimated completion time	Description
MAC Address Verification	1 second	Verifies MAC address is not all FFs or 00s.
Ethernet ROM Checksum	1 second	Verifies Ethernet ROM checksum is valid.
MAC Loopback	1 minute	Verifies that there's no data mismatch between sent and received data while looping within the MAC (a sublayer of the datalink layer in the ISO network reference model).
PHY 1000 Loopback	20 seconds per port, 40 seconds total	Verifies that there's no data mismatch between sent and received data while looping within the physical transport medium (PHY) at 1000 Mbps.
PHY Jumbo Packet Loopback	20 seconds per port, 40 seconds total	Verifies that there's no data mismatch between sent and received jumbo packet data while looping within the physical transport medium (PHY) at the the highest supported speed.

Fan Tests

When AXD Mac OS X tools starts, it performs a hardware existence test. All fans found during this test can be tested individually using fan tests.

Test	Estimated completion time	Description
Verify Motor +/– 10%, 10 Reads High, 20 Low	2 minutes	Verifies the minimum and maximum fan speeds. Sets the minimum and maximum builds within 10% of the threshold and then does 10 consecutive reads at the maximum and 20 at the minimum.
Verify Motor Automatically +/– 15%	2 minutes	Verifies the minimum and maximum fan speeds. Sets the minimum and maximum builds within 15% of the threshold.

Hard Drive Tests

When AXD Mac OS X tools starts, it performs a hardware existence test. All hard drives and solid-state drives found during this test can be tested individually using hard drive tests.

Test	Estimated completion time	Description
Threaded Surface Scan	21 minutes for an 80 GB drive; 3 hours for a 1 TB drive	Scans the entire surface of a hard drive. This test is available for hard drives, not solid-state drives.
Threaded Surface Short Scan	1 minute	Scans the first 10 GB of a hard drive. This test is available for hard drives, not solid-state drives.
Check SMART Status	1 second	Checks the SMART status of a hard drive. This test is available for hard drives, not solid-state drives.

Test	Estimated completion time	Description
Short Random Multi-block	2 minutes	Performs a threaded, random multi-block read of random ranges of the target hard drive. This is not a full surface scan, but it will cause rapid seeking and reading of hard drive blocks. If a block can't be read, an error occurs. This test is available for hard drives, not solid-state drives.
SSD Threaded Media Scan	Not available	Scan's the entire accessible area of a solid-state drive. This test is available for solid-state drives, not hard drives.
SSD New Drive SMART Data	Not available	Checks the SMART status of a solid-state drive. This test is available for solid-state drives, not hard drives.

Memory Tests

All memory tests are categorized here.

Simple Memory Tests

AXD Mac OS X memory tests test the first 2.5 GB of memory. All multicore memory tests listed in AXD EFI tools are run.

Even though these tests don't test all memory, run these tests to detect intermittent memory issues.

After the first 2.5 GB of memory is tested, the memory test then tests for ECC errors. When an ECC error occurs, memory catches the problem and fixes it. The test detects the number of memory fixes and reports them.

Note: The time required to complete memory tests correlates to the size of memory being tested. These estimates are based on testing 1 GB of memory.

Test	Estimated completion time	Description
Simple Test	12 minutes	Runs all multicore memory tests listed in AXD EFI tools, reports the number of ECC errors, and then resets the count.

SMBIOS Memory Tests

Test	Estimated completion time	Description
SMBIOS Self-Test	1 second	Checks the SMBIOS tables for 32-bit errors (type 18) and 64-bit errors (type 33). Also verifies that the mapped-in DIMM size is appropriate for the slot it's inserted into. If there's a size mismatch, an error occurs.

ECC Memory Tests

Test	Estimated completion time	Description
ECC Error Count	1 second	Reports the number of ECC errors, and then resets the count.

Power Supply Tests

Test	Estimated completion time	Description
Good	1 second	Checks if the power supply's good bit is set. If it's not set, this could indicate that the power supply isn't seated well or is bad, or that there's no AC connected.
Quick	5 seconds	This is available only if you have more than one power supply. This turns off the redundant power supplies so that only one is run on.

Sensor Tests

When AXD Mac OS X tools starts, it performs a hardware existence test. All sensors found during this test can be tested individually using sensor tests.

Test	Estimated completion time	Description
Sensor Reads	1 second	Verifies that the sensor reads are within the preset sensor limits.

USB Tests

Connect USB devices before running USB tests.

Test	Estimated completion time	Description
Presence	1 second	Verifies that a USB device is connected.

Video Controller Tests

To run these tests, a display must be attached to any graphics cards being tested. The displays can't be in sleep. For example, if you have two graphics cards, they both need a display attached and both displays must not be in sleep.

Test	Estimated completion time	Description
OpenGL Point	10 seconds	Verifies video controller using a 2D point test.
OpenGL Line	10 seconds	Verifies video controller using a 2D line test.
OpenGL Triangle	10 seconds	Verifies video controller using a 2D triangle test.
OpenGL Quad	10 seconds	Verifies video controller using a 2D quadrilateral test.
OpenGL Quad with Texture	10 seconds	Verifies video controller using a 2D textured quadrilateral test.
OpenGL Rectangle	10 seconds	Verifies video controller using a 2D rectangle test.
OpenGL Cube	10 seconds	Verifies video controller using a 3D cube test.
OpenGL Cube with Fog	10 seconds	Verifies video controller using a 3D cube with fog test.
OpenGL Wireframe	10 seconds	Verifies video controller using a 3D wireframe test.
OpenGL Solid Red Model	10 seconds	Verifies video controller using a 3D solid red model test.
OpenGL Solid Red Model with Fog	10 seconds	Verifies video controller using a 3D solid red model with fog test.